REMARKS

Minor formal corrections have been made to the specification and claims. No new matter has been introduced in these amendments.

The title has been amended to reflect more closely the subject matter to which the elected claims are directed, as requested by the Examiner.

Claim Amendments

Particles of the present invention, in some embodiments, consist of a plurality of segments that vary in composition, length, width, or any other characteristic enabling the segments to be distinguished. Different types of particles in an assembly can be differentiated based on their patterns of segments, as defined by, e.g., the length, composition, sequence, or number of segments.

Independent claim 37 has been amended to specify that at least one particle type in the assembly of segmented particles is differentiable from another particle type based on the sequences of their segments. Support for this amendment is found, e.g., in original claim 38, now canceled; on p. 9, lines 31-32 ("sequential segments"); p. 19, lines 21-23 ("bar sequence and spacing"); p. 66, line 25 ("Each sequential metal segment"); in Example 1, pp. 55-56; and in Fig. 5.

Independent claim 55 has been amended to specify that particles in the assembly are rod shaped, support for which is found, e.g., on p. 4, lines 3-5, and that each particle has at least one dimension greater than about 10 nm, support for which is found, e.g., on p. 4, line 7. Claim 55 has also been amended to specify that at least one particle type is made by a process having different synthesis parameters from those of the process by which another particle type is made. Synthesis parameters are discussed, e.g., beginning on p. 25, line 26, and include, without limitation, particle composition, template pore diameter, and amount of current passed.

Claim Rejections – 35 USC §112, ¶ 2

Claims 37-47 and 55-64 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

The Examiner found the word "differentiable" in independent claims 37 and 55 to be unclear, stating that the claims do not specify from what the types of particles are differentiable. Claims 37 and 55 have been amended to specify that at least one of the types of particles is differentiable from another of the types. Applicants believe that these amendments address the Examiner's rejections and respectfully request that the rejections be withdrawn.

Claim Rejections – 35 USC §102

Liu et al.

Claims 37-39, 42, 43, 45-47, 55-61, 63, and 64 were rejected under 35 U.S.C. 102(b) as being anticipated by Liu et al., *Phys. Rev. B* 51(11):7381-7384, 1995.

Liu et al. discloses arrays of nanowires fabricated by electrochemical deposition into pores of a polycarbonate membrane. The wires, used to study giant magnetoresistance, consist of multiple bilayers of cobalt and copper.

Claim 37, as amended, recites an assembly of segmented particles containing a plurality of types of particles. At least two particle types are differentiable from each other based on differences in the sequence of their segments. For example, as shown in Fig. 5, particles A, C, and F can be differentiated in the reflectance image based on the different sequences of segments making up the three particle types.

The Examiner asserts that Fig. 2 of Liu et al. shows nanowires that are nonuniform in structure and therefore differentiable from each other. Despite the nonuniformity in structure, all of the nanowires contain the identical alternating sequence of cobalt and copper layers. These nanowires are not, therefore, differentiable based on the sequences

of their layers, as are the particles of claim 37. Because Liu et al. does not disclose all of the limitations of amended claim 37, it cannot anticipate the claim. Applicants respectfully request withdrawal of the rejections of claim 37 and its dependent claims 38, 39, 42, 43, and 45-47.

Independent claim 55, as amended, specifies that at least two different particle types are made by processes having different synthesis parameters. That is, at least one of the synthesis parameters is varied to yield differentiable particle types. The nanowires in the assembly shown in Fig. 2 of Liu et al., in contrast, are all made in a single process with a single set of parameters. The differences among nanowires result not from differences in synthesis parameters as specified in claim 55, but rather from random relaxation of wires in the array after dissolution of the supporting membrane. Liu et al. does not, therefore, disclose all of the limitations of claim 55 and cannot anticipate the claim. Applicants respectfully request withdrawal of the rejections of claim 55 and its dependent claims 56-61, 63, and 64.

Wang et al.

Claims 37-39, 42, 43, 45-47, 55-61, 63, and 64 were rejected under 35 U.S.C. 102(b) as being anticipated by Wang et al., *Thin Solid Films* 288:86-89, 1996.

Wang et al. discloses an array of metallic nanowires containing "subsequent copper and nickel layers [that are] revealed in bright/dark succession" (p. 87, final paragraph) in Fig. 4, which is an image of part of a single nanowire. As with the nanowires of Liu et al., all of the nanowires of Wang et al., such as those in the group in Fig. 3, have the same alternating sequence of layers. Thus, as explained above with reference to Liu et al., Wang et al. cannot anticipate amended claim 37, which specifies that at least two types of particles are differentiated based on differences in the sequence of their segments. Applicants respectfully request withdrawal of the rejections of claim 37 and its dependent claims 38, 39, 42, 43, and 45-47.

Regarding independent claim 55, which specifies that particle types in the assembly are

made by processes having different synthesis parameters, all of the nanowires in an assembly of wires of Wang et al., such as those shown in Fig. 3, are made by a single process having a single set of parameters. Any difference in particle types is a result of random and uncontrolled differences in template pores and other factors involved in wire synthesis (see section 3, Results and discussion, pp. 87-89). Wang et al. does not, therefore, anticipate claim 55, and Applicants request withdrawal of the rejections of claim 55 and its dependent claims 56-61, 63, and 64.

Kaye et al.

Claims 37-47 and 55-64 were rejected under 35 U.S.C. 102(b) as being anticipated by PCT Publication No. WO 97/15390, Kaye et al., 1997.

Kaye et al. discloses coded particles for process sequence tracking in combinatorial synthesis. Each particle is "labeled with a unique, permanent code" (p. 7, line 14). In some embodiments, the particles are made of "two distinct phases, one, a solid support material for library synthesis and the other a phase containing a machine-readable code" (p. 10, lines 23-24). The layered particles, shown in Fig. 6 of Kaye et al., contain a varying code in only one of the layers, and are differentiable from each other based on this code. The two-layer sequence (support material, coded phase) is identical for all particles.

Independent claim 37, as amended, specifies that at least two types of particles are differentiable from each other based on differences in the sequences of the segments of the particles. Because all of the two-layer particles of Kaye et al. have the same sequence of layers, they cannot be differentiated by segment sequence. Kaye et al. cannot, therefore, anticipate claim 37. Applicants respectfully request withdrawal of the rejections of independent claim 37 and its dependent claims 38-47.

Claim 55, as amended, recites an assembly of rod-shaped particles. None of the particles disclosed in Kaye et al. are rod shaped. A variety of different shapes are shown and described. Factors influencing the choice of particle shape include the amount of surface area available as a combinatorial chemistry support (see, e.g., p. 5, lines 8-11), the ability

to read the code remotely by machine (p. 7, lines 15-16), and the ability to determine the proper code orientation using an orientation marking that renders particles non-symmetric (p. 15, lines 9-11; p. 18, lines 10-12). Additionally, "the geometry of the coded phase will depend on the shape of the first phase, the nature of the coded information amongst other factors" (p. 17, lines 16-17). In the different examples of machine-readable code provided in Kaye et al., the code is produced by micromachining or photolithographic processes. These methods require, typically, a planar substrate such as a silicon wafer, precluding the use of rod-shaped particles. All of the figures in Kaye et al. show the code in a planar surface.

Similarly, even particles with high aspect ratios are not shown as rod shaped in Kaye et al. When the particles are read on-the-fly, "by designing the particles to have a reasonably high aspect ratio of length to width (typically 5:1), the particles can be made to travel along the channel with their long axis preferentially aligned with the axis of flow, thus facilitating observation of the codes." One example of such particles is a "'lozenge'-shaped microparticle" (p. 20, line 16), shown in Fig. 4, which is clearly not a rod-shaped particle.

Thus Kaye et al does not disclose rod-shaped particles and cannot anticipate claim 55. Applicants respectfully request withdrawal of the rejections of claim 55 and its dependent claims 56-64.

Sorge

Claims 55-64 were rejected under 35 U.S.C. 102(a) as being anticipated by PCT Publication No. WO 99/18240, Sorge, 1999.

Sorge discloses combinatorial libraries in which compounds are tagged by nucleic acids containing, in preferred embodiments, up to 20 nucleotides. Claim 55, as amended, recites an assembly of rod-shaped particles. The tags of Sorge are not rod-shaped particles and Sorge does not, therefore, anticipate claim 55. Amended claim 55 also requires that the particles have at least one dimension greater than about 10 nm. As noted by the

Examiner, a double-stranded 20-nucleotide tag has a length of approximately 68 Angstroms, much less than 10 nm and therefore not within the claimed range. Applicants respectfully request withdrawal of the rejections of claim 55 and its dependent claims 56-64.

New claims

New claim 87 recites an assembly of encoded, segmented particles containing a plurality of <u>each</u> of a plurality of types of particle. At least two particle types in the assembly are differentiable from each other based on the particle encoding. Support for new claim 87 and its dependent claims is found, e.g., in the original claims and on p. 5, lines 11-18, of the present application.

None of the prior art of record discloses an assembly of different types of segmented, encoded particles containing a plurality of each particle type. Neither the nanowires of Liu et al. nor the nanowires of Wang et al. are encoded. Sorge does not disclose particles in the required size range. Kaye et al. discloses only one of each type of coded support particles, emphasizing the necessity for particle uniqueness in the combinatorial chemistry applications for which they are designed. For example, the solid supports are "each labeled with a unique, permanent code" (p. 7, lines 14-15) that is used to "identify the sequence of reactions experienced by substantially each support particle" (p. 7, lines 11-12). Kaye et al. specifies the importance of "assigning a unique code to each and every process path" (p. 18, lines 7-8). If two particles were to have the same code, it would be impossible to identify correctly the synthesis path taken by each of the duplicate particles. In fact, even when multiple particles are subject to the identical sequence of reactions, they are each required to have a unique code (p. 17, lines 21-23).

New claim 96 recites an assembly of different types of particles, each having a striping pattern by which at least two of the types are differentiable from each other. The striping pattern includes the sequence, composition, and length of individual segments making up the stripes. Support for new claim 96 and its dependent claims 97-104 is found, e.g., in the original claims and on p. 32, lines 26-30, and p. 59, lines 12-15, of the present

application.

None of the prior art of record discloses particles that are differentiable based on a striping pattern. The particles of Kaye et al. do not have striping patterns. Sorge does not disclose particles having a striping pattern or the required size range. The nanowires in the assemblies of Liu et al. and Wang et al. all have identical sequences of alternating layers.

Applicants therefore submit new claims 87-104 to be patentable over the prior art of record.

Thus, Applicants request that the Examiner reconsider the application and issue a Notice of Allowance in the next Office Action. If it would be helpful to obtain favorable consideration of this case, the Examiner is encouraged to call and discuss this case with the undersigned.

This constitutes a request for any needed extension of time and an authorization to charge all fees therefor to deposit account No. 19-5117, if not otherwise specifically requested. The undersigned hereby authorizes the charge of any fess created by the filing of this document or any deficiency of fees submitted herewith to be charged to deposit account No. 19-5117.

Respectfully submitted,

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